

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings of claims in the application:

LISTING OF CLAIMS:

1-99. (cancelled)

100. (new) A method of organic synthesis in a homogeneous phase on a soluble reaction support, without volatile organic solvents, comprising:

dissolving a soluble reaction support in the form of a functionalized salt in a liquid matrix in the form of an ionic liquid to provide a homogeneous phase for organic synthesis on the soluble reaction support, without volatile organic solvents; and

adding at least one reagent to said homogeneous phase to react with a functional ion of said soluble reaction support, wherein,

said ionic liquid is of formula  $A_1^+X_1^-$  and is in liquid or solid form at ambient temperature,

$A_1^+$  is one of a non-functional cation and a mixture of non-functional cations,

$X_1^-$  is one of a non-functional anion and a mixture of non-functional anions,

said soluble reaction support is at least one functionalized salt of formula  $A_2^+X_2^-$ ,

$A_2^+$  is selected from the group consisting of a functional cation, a non-functional cation, a mixture of cations in which none of the cations is functional, and a mixture of cations in which at least one of the cations is functional,

$X_2^-$  is selected from the group consisting of a functional anion, non-functional anion, a mixture of anions in which none of the anions is functional, and a mixture of anions in which at least one of the anions is functional,

at least one of  $A_2^+$  and  $X_2^-$  is a functional ion, said functional cation is of a formula  $Y^+-L-F_i$  and said functional anion is of a formula  $Y^{--}(L)_k-F_i$ ,

$Y^+-$  and  $Y^{--}$  are ionic entities that carry the charge of the cation and the charge of the anion, respectively, linked via a linker L to at least one function  $F_i$ ,

L is an alkyl group of 1 to 20 carbon atoms,

$F_i$  varies from  $F_0$  to  $F_n$ , n being an integer varying from 1 to 10, with  $F_0$  being a function initially linked to said cationic entities and anionic entities and  $F_1$  to  $F_{10}$  being functions converted from said  $F_0$  after sequential and subsequent reactions with said cationic or anionic entities,

said function  $F_i$  is selected from the group consisting of hydroxyl, carboxylic, amide, sulphone, primary amine,

secondary amine, aldehyde, ketone, ethenyl, ethynyl, dienyl, ether, epoxide, primary phosphine, secondary phosphine, tertiary phosphine, azide, imine, ketene, cumulene, heterocumulene, thiol, thioether, sulphoxide, phosphorus-containing moieties, heterocycles, sulphonic acid, silane, stannane and functional aryl functions,

k is equal to 0 or 1, and

R is an alkyl group of 1 to 20 carbon atoms or an aryl group of 6 to 30 carbon atoms.

101. (new) The method of claim 100, wherein,

at least one of the  $A_2^+$  cation and the  $X_2^-$  anion of the at least one functionalized salt corresponding to a  $Y^-$  ionic entity linked to at least one function  $F_i$  is immobilized in the liquid matrix and cannot be extracted from the liquid matrix by solvent extraction, and

the function or functions  $F_i$  of the at least one functionalized salt can be converted after at least one reaction resulting from the addition of at least one reagent to said homogeneous phase.

102. (new) The method of claim 101, wherein more than one functionalized salt is immobilized.

103. (new) The method of claim 100, wherein  $A_2^+$  cation is functional.

104. (new) The method of claim 100, wherein the  $X_2^-$  anion is functional.

105. (new) The method of claim 100, wherein  $A_2^+$  and  $X_2^-$  are functional.

106. (new) The method of claim 100, wherein,  
said  $A_1^+X_1^-$  is an ionic liquid that is solid at ambient temperature and liquefiable with a temperature range from approximately 25°C to approximately 250°C, and

said functionalized salt  $A_2^+X_2^-$  is selected from the group consisting of: an ionic liquid that is solid at ambient temperature and that is soluble in a liquefied solid form of  $A_1^+X_1^-$ , and an ionic liquid that is liquid at ambient temperature and that is miscible with the liquefied solid form of  $A_1^+X_1^-$ .

107. (new) The method of claim 100, wherein,  
said  $A_1^+X_1^-$  is an ionic liquid that is liquid at ambient temperature, and

said functionalized salt  $A_2^+X_2^-$  is selected from the group consisting of: an ionic liquid that is solid at ambient temperature and that is soluble or partially soluble in the liquid form of  $A_1^+X_1^-$  within a temperature range from approximately 25°C to approximately 250°C, and an ionic liquid that is liquid at ambient temperature and that is miscible with the liquid form of  $A_1^+X_1^-$ .

108. (new) The method of claim 100, wherein said ionic liquid of formula  $A_1^+X_1^-$  has a viscosity less than or equal to approximately 1500 cp (15 N.s/m<sup>2</sup>).

109. (new) A method of organic synthesis in a homogeneous phase on a soluble reaction support, without volatile organic solvents, comprising:

dissolving a soluble reaction support in the form of a functionalized salt in a liquid matrix in the form of a ionic liquid to provide a homogeneous phase for organic synthesis on the soluble reaction support, without volatile organic solvents; and

adding at least one reagent to said homogeneous phase to react with a functional ion of said soluble reaction support, wherein,

said ionic liquid is of formula  $A_1^+X_1^-$  and is in

liquid or solid form at ambient temperature,

$A_1^+$  is selected from the group consisting of a functional cation, a non-functional cation, a mixture of non-functional cations, and a mixture of cations in which at least one of the cations is functional, and

$X_1^-$  is selected from the group consisting of a functional anion, a non-functional anion, a mixture of non-functional anions, and a mixture of anions in which at least one of the anions is functional,

at least one of  $A_1^+$  and  $X_1^-$  is a functional ion,  
said functional cation is of a formula  $Y^+-L-F_i$  and  
said functional anion is of a formula  $Y^{--}(L)_k-F_i$ ,

$Y^{+-}$  and  $Y^{--}$  are ionic entities that carry the charge of the cation and the charge of the anion, respectively, linked via an linker L to at least one function  $F_i$ ,

L is an alkyl group of 1 to 20 carbon atoms,

$F_i$  varies from  $F_0$  to  $F_n$ , n being an integer varying from 1 to 10, with  $F_0$  being a function initially linked to said cationic entities and anionic entities and  $F_1$  to  $F_{10}$  being functions converted from said  $F_0$  after sequential and subsequent reactions with said cationic or anionic entities,

said function  $F_i$  is selected from the group consisting of hydroxyl, carboxylic, amide, sulphone, primary amine, secondary amine, aldehyde, ketone, ethenyl, ethynyl,

dienyl, ether, epoxide, primary phosphine, secondary phosphine, tertiary phosphine, azide, imine, ketene, cumulene, heterocumulene, thiol, thioether, sulphoxide, phosphorus-containing moieties, heterocycles, sulphonic acid, silane, stannane and functional aryl functions,

k is equal to 0 or 1, and

R is an alkyl group of 1 to 20 carbon atoms or an aryl group of 6 to 30 carbon atoms.

110. (new) The method of claim 109, wherein,

a first part of said ionic liquid of formula  $A_1^+X_1^-$  provides the cationic entity  $Y^+$  or the anionic entity  $Y^-$  linked to one or more initial functions  $F_0$  as the liquid matrix,

a second part of said ionic liquid of formula  $A_1^+X_1^-$  provides the functionalized salt for the soluble reaction support so that the initial functions  $F_0$  are converted into first novel functions, and

the first novel functions of the second part of said ionic liquid being capable of being converted subsequently into other functions without affecting the initial function  $F_0$  of the first part of said ionic liquid.

111. (new) The method of claim 109, wherein said ionic liquid  $A_1^+X_1^-$  is selected from the group consisting of: an ionic

liquid that is liquid at ambient temperature, and an ionic liquid that is solid at ambient temperature and is liquefiable within a temperature range from approximately 25°C to approximately 250°C.

112. (new) The method of claim 109, wherein said ionic liquid of formula  $A_1^+X_1^-$  has a viscosity less than or equal to approximately 1500 cp (15 N.s/m<sup>2</sup>).

113. (new) A stable composition comprising:

an ionic liquid of formula  $A_1^+X_1^-$ , with a first part providing a liquid matrix of  $A_1^+$  and/or  $X_1^-$  ionic entities linked to one or more initial functions  $F_0$  and a second part providing a functionalized salt as a soluble reaction support, the liquid matrix and functionalized salt forming a homogeneous phase, wherein,

the functionalized salt converts the one or more initial functions  $F_0$  into first novel functions of the second part of the ionic liquid, and,

the first novel functions of the second part of the ionic liquid are capable of being subsequently converted to other functions, without affecting the initial function or functions  $F_0$  of the first part of the ionic liquid.



114. (new) A stable composition comprising, in solution:

an ionic liquid of formula  $A_1^+X_1^-$  providing a liquid matrix; and

one functionalized salt of formula  $A_2^+X_2^-$  providing a soluble reaction support and being dissolved in the liquid matrix so that the composition forms a homogeneous phase, wherein,

$A_1^+$  is a non-functional cation or a mixture of cations in which none of the cations is functional,

$X_1^-$  is a non-functional anion or a mixture of anions in which none of the anions is functional,

$A_2^+$  is selected from the group consisting of a functional cation, non-functional cation, a mixture of cations in which none of the cations is functional, and a mixture of cations in which at least one cation is functional,

$X_2^-$  is selected from the group consisting of a functional anion, a non-functional anion, a mixture of anions in which none of the anions is functional, and a mixture of anions in which at least one anion is functional, at least one of  $A_2^+$  and  $X_2^-$  is a functional ion,

said functional cation is of a formula  $Y^+-L-F_i$   
and said functional anion is of a formula  $Y^--(L)_k-F_i$  ,

$Y^+$  and  $Y^-$  are ionic entities that carry the charge

of the cation and the charge of the anion, respectively, linked via an linker L to at least one function  $F_i$ ,

L is an alkyl group of 1 to 20 carbon atoms,

$F_i$  varies from  $F_0$  to  $F_n$ , n being an integer varying from 1 to 10, with  $F_0$  being a function initially linked to said cationic entities and anionic entities and  $F_1$  to  $F_{10}$  being functions converted from said  $F_0$  after sequential and subsequent reactions with said cationic or anionic entities,

said function  $F_i$  is selected from the group consisting of hydroxyl, carboxylic, amide, sulphone, primary amine, secondary amine, aldehyde, ketone, ethenyl, ethynyl, dienyl, ether, epoxide, primary phosphine, secondary phosphine, tertiary phosphine, azide, imine, ketene, cumulene, heterocumulene, thiol, thioether, sulphoxide, phosphorus-containing moieties, heterocycles, sulphonic acid, silane, stannane and functional aryl functions,

k is equal to 0 or 1, and

R is an alkyl group of 1 to 20 carbon atoms or an aryl group of 6 to 30 carbon atoms.

115. (new) The composition of claim 114, wherein the

$A_2^+$  cation and/or the  $X_2^-$  anion of the functionalized salt or salts, corresponding to a Y- ionic entity linked to at least one function  $F_i$ , are immobilized in the liquid matrix and cannot be extracted from the liquid matrix by solvent extraction.

116. (new) The composition of claim 114, wherein, the liquid matrix is non-reactive vis-à-vis the functionalized salt.

117. (new) The composition of claim 114, wherein  $A_2^+$  is a functional cation.

118. (new) The composition of claim 117, wherein the  $X_1^-$  and  $X_2^-$  anions are identical.

119. (new) The composition of claim 117, wherein, the  $A_1^+$  and  $A_2^+$  cations are onium cations selected from the group consisting of substituted or non-substituted pyridinium, imidazolium, ammonium, phosphonium or sulphonium cations, and

the  $X_1^-$  and  $X_2^-$  anions are selected from the group consisting of non-complex anions and complex anions,

non-complex anions being selected from the group consisting of:  $BF_4^-$ ,  $PF_6^-$ ,  $CF_3SO_3^-$ ,  $CH_3COO^-$ ,  $CF_3CO_2^-$ ,  $N(SO_2CF_3)_2$ , halides,  $BR_4^-$ ,  $RCO_2^-$  and  $RSO_3^-$  with R selected from the group consisting of an alkyl group of 1 to 20 carbon atoms, an aryl group of 6 to 30 carbon atoms, a perfluorinated group and partially fluorinated group, and  $R'SO_4^-$  anions with R' selected

from the group consisting of a hydrogen atom, a methyl group and an ethyl group, and

complex anions resulting from the combination of a Lewis acid and a halide X, said complex anion being of general formula  $MX_j$  with j being an integer between 1 and 7, and M representing a metal selected from the group consisting of aluminum, tin, zinc, bismuth, manganese, iron, copper, molybdenum, antimony, gallium or indium.

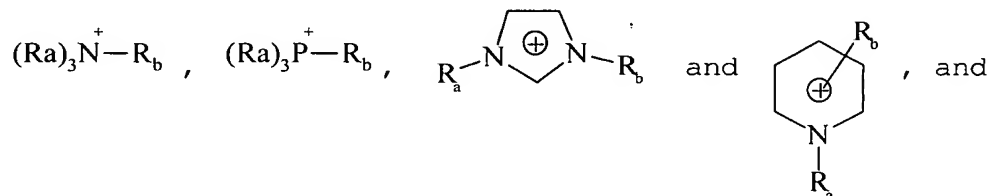
120. (new) The composition of claim 114, wherein, the  $Y^{+}$ - cationic entity carries the positive charge of the cation and is linked via an linker L to a function  $F_0$ ,

L is an alkyl group comprising 1 to 20 carbon atoms, and,

function  $F_0$  is selected from the group consisting of hydroxyl, carboxylic, amide, sulphone, primary amine, secondary amine, aldehyde, ketone, ethenyl, ethynyl, dienyl, ether, epoxide, phosphine (primary, secondary or tertiary), azide, imine, ketene, cumulene, heterocumulene, thiol, thioether, sulphoxide, phosphorus-containing moieties, heterocycles, sulphonic acid, silane, stannane and functional aryl functions.

121. (new) The composition of claim 114, wherein,  $X_1^{-}$  is selected from the group consisting of:  $NTf_2^{-}$ ,  $PF_6^{-}$ ,  $BF_4^{-}$  and  $CF_3SO_3^{-}$ ,

$A_1^+$  is selected from the group consisting of:

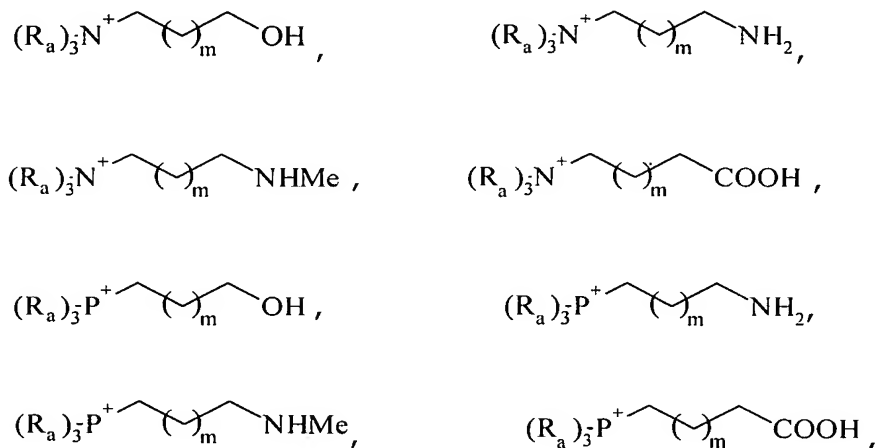


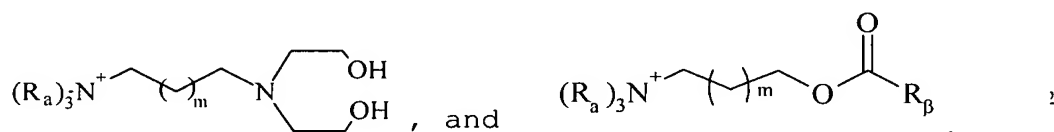
$R_a$  and  $R_b$  are linear or branched alkyl groups of 1 to 20 carbon atoms, functional alkyl groups of 1 to 20 carbon atoms, or functional or non-functional aryl groups of 6 to 30 carbon atoms.

122. (new) The composition of claim 114, wherein

$X_2^-$  is selected from the group consisting of:  $NTf_2^-$ ,  $PF_6^-$ ,  $BF_4^-$ ,  $Cl^-$ ,  $Br^-$ ,  $I^-$ ,  $CF_3SO_3^-$ ,  $MeSO_4^-$ ,  $EtSO_4^-$ ,  $MeSO_3^-$ ,  $C_6H_5SO_3^-$ , and  $pMeC_6H_4SO_3^-$ ,

$A_2^+$  is selected from the group consisting of:





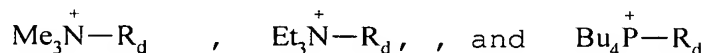
m is an integer comprised between 0 and 20,

$R_\beta$  is selected from the group consisting of a substituted or non-substituted vinyl group, a functional aryl group of 1 to 20 carbon atoms, and a functional alkyl group of 6 to 30 carbon atoms, and

$R_a$  is a branched or non-branched alkyl group of 1 to 20 carbon atoms.

123. (new) The composition of claim 114, wherein,

$A_2^+$  is selected from the group consisting of



$R_d$  is an alkyl group comprising 1 to 20 carbon atoms,

$X_2^-$  is a functional anion corresponding to an anion of a conjugated acid having a  $pK_A$  less than 30, and is selected from the group consisting of:  $OH^-$ ,  $F^-$ ,  $R_cBZ_3^-$ ,  $N_3^-$ ,  $CN^-$ , and  $WCR_cV^-$ ,

Z is -F, -OH, or an -OR group, R being an alkyl group comprising 1 to 20 carbon atoms,

V and W are, independently of each other, an electroattractive group selected from the group consisting of a cyano, a alkoxycarbonyl moiety of 2 to 20 carbon atoms, acyl

moiety of 2 to 20 carbon atoms, benzoyl, alkyl sulphonyl moiety of 1 to 20 carbon atoms, aryl sulphonyl moiety of 6 to 30 carbon atoms, and dialkoxyphosphonyl moiety of 2 to 20 carbon atoms, and

$R_c$  is selected from the group consisting of a branched, non-branched, cyclic or non-cyclic alkyl moiety of 1 to 20 carbon atoms and an aryl moiety of 6 to 30 carbon atoms.

124. (new) A stable composition comprising:

an ionic liquid matrix of formula  $A_1^+X_1^-$  with non-functional ions, and,

a functionalized salt of formula  $A_2^+X_2^-$  with at least one functional ion that is dissolved in the ionic liquid matrix so that the composition forms a homogeneous phase, wherein,

$A_1^+$  and  $A_2^+$  are substituted or non-substituted onium cations selected from the group consisting of pyridinium, imidazolium, ammonium, phosphonium or sulphonium cations, and,

$X_1^-$  and  $X_2^-$  anions are selected from the group consisting of  $BF_4^-$ ,  $PF_6^-$ ,  $CF_3SO_3^-$ ,  $CH_3COO^-$ ,  $CF_3CO_2^-$ ,  $N(SO_2CF_3)_2^-$ , halides,  $BR_4^-$ ,  $RCO_2^-$  and  $RSO_3^-$  with R selected from the group consisting of an alkyl group of 1 to 20 carbon atoms, an aryl group of 6 to 30 carbon atoms, a perfluorinated or partially fluorinated group,  $R'SO_4^-$  with  $R'$  being selected from the group consisting of a hydrogen atom, a methyl group or an ethyl group, and complex anions resulting from the combination of a Lewis acid

and a halide X of general formula  $MX_j$  with j being an integer between 1 and 7, X being a halide and M representing a metal selected from the group consisting of aluminum, tin, zinc, bismuth, manganese, iron, copper, molybdenum, antimony, gallium or indium,

said at least one functional ion is one of a functional cation of a formula  $Y^+-L-F_1$  and a functional anion of a formula  $Y^--(L)_k-F_1$ ,

$Y^+$  and  $Y^-$  are ionic entities that carry the charge of the cation and the charge of the anion, respectively,

L is an alkyl group of 1 to 20 carbon atoms,

$F_1$  is a function varying from  $F_0$  to  $F_n$ , and selected from the group consisting of hydroxyl, carboxylic, amide, sulphone, primary amine, secondary amine, aldehyde, ketone, ethenyl, ethynyl, dienyl, ether, epoxide, primary phosphine, secondary phosphine, tertiary phosphine, azide, imine, ketene, cumulene, heterocumulene, thiol, thioether, sulphoxide, phosphorus-containing moieties, heterocycles, sulphonic acid, silane, stannane and functional aryl functions,

$F_0$  being a function initially linked to said ionic entities,

n being an integer varying from 1 to 10 representing a number of reactions,

$F_1$  to  $F_{10}$  being functions converted from said  $F_0$  after



sequential reactions with said ionic entities,

k is equal to 0 or 1 and

R is an alkyl group of 1 to 20 carbon atoms or an  
aryl group of 6 to 30 carbon atoms.